

Commonwealth of Kentucky
Division for Air Quality
PERMIT STATEMENT OF BASIS

TITLE V DRAFT PERMIT NO. V-04-031
FLORIDA TILE INDUSTRIES, INCORPORATED
LAWRENCEBURG, KY
JUNE 8, 2004
CAROLINA ALONSO, REVIEWER
PLANT I.D. # 21-005-00008
APPLICATION LOG # 56300

SOURCE DESCRIPTION:

Florida Tile Industries, Inc (Florida Tile) currently operates a ceramic floor and wall tile manufacturing facility in Lawrenceburg, Kentucky. The facility is a Title V major source operating under the authority of Title V Permit No. V-99-020 (Revision 2). In addition to renewing the Title V Permit, this permit includes several modifications proposed by Florida Tile, including:

- The addition of bisque grinding and raw material milling equipment that will recycle scrap tile (bisque) and process raw materials;
- The addition of a prill transport system to convey spray-dried tile body material to Lines 1 and 2;
- The addition of several high-volume tile presses and glaze applicators to Line 4; and
- An increase in the normal operating temperature and cycle time of the kilns on Lines 1, 2, and 5.

This permit also incorporates previous permit revisions, off-permit changes, and 502 (b)(10) changes which Florida Tile has undertaken since the original Title V permit was issued. Changes to terminology used in the permit have also been made in order to more accurately reflect the plant's operations and monitoring systems based upon the 5 year experience with the Title V permit and filing of semi-annual reports. The permit does not include a Compliance Assurance Monitoring (CAM) Plan, as there are no individual emission units that have uncontrolled potential emissions of 100 tons per year or more.

The production of tile, traditional or fast-fire, begins at the railcar unloading area, where raw materials are received by truck or railcar and transported through a pipeline using the truck compressor or in the case of the railcar, a Fuller Kenyon pump, to one of six storage silos (EP 01, EP 02, EP 03, EP 53, EP 54, EP 55). Raw materials are transported via conveyors to the Traditional Body Mixer (EP 56), the Fast-Fire Body Mixer (EP 11), or the Blunger System (EP 73) in the Spray Dryer area. Rejected unfired tile (greenware) is recycled in the Traditional and Fast-Fire Rework Systems (EP 58 and EP 16) and used as an additive in the Mixers. Water is added to the raw

materials and recycled greenware in the Mixers to form tile body, which is then transported to the Fast-Fire Body Transport System (EP 63) or Traditional Body Transport System (EP 59). Water is added to the raw materials in the Blunger System to form a slurry that is dried in the Spray Dryer (EP 74) to form a tile body material known as prill. The prill is stored in Prill Silos (EP 75).

The mixed fast-fire tile body is transferred by the Fast-Fire Body Transport System to the Press Hoppers for Lines 1 and 2 (EP 95 and EP 96). The mixed traditional tile body is transferred by the Traditional Body Transport System to the Press Hoppers for Lines 3 and 4 (EP 97 and EP 98). The prill is transferred from the Prill Silos to the Press Hoppers for Line 5 (EP 99). The Press Hoppers on each of the lines feed the tile body to the Tile Presses where it is formed into the appropriate tile shape. After pressing, the tile passes through a tile dryer on the line to remove some of the moisture content. Various glazes are then applied to the tile by a variety of glaze application systems, including glaze spray booths and dry glaze booths. Finally, the glazed tile is fired in a kiln. On Lines 1, 2, and 5 Roller Kilns with Pre-dryers (EP 39, EP 42, and EP 29, respectively) are used to fire the tile. On Lines 3 and 4, Tunnel Kilns (EP 42 and 40, respectively) are used.

Florida Tile is planning to add bisque and tile body raw material milling equipment at the plant. The bisque milling equipment will consist of a Storage Hopper (EP 91), a Pre-Crusher (EP 92), and a Grinding Mill with Vibrating Screen (EP 93). The tile body raw material milling process will consist of Raw Material Storage Piles (EP 90) in a covered area and a Ball Mill (EP 94). This equipment will be located near the Spray Dryer. An additional blunger is also being added to the Blunger System in the Spray Dryer Area and a Prill Transport System (EP 76) is being added to convey spray-dried tile body from the Prill Silos to the presses on Lines 1 and 2. Lastly, Florida Tile is proposing to add two new tile presses and three new glaze applicators to Line 4.

COMMENTS:

EMISSIONS

The facility is considered a Title V major source based on its potential emissions of Particulate Matter (PM), Carbon Monoxide (CO), and Hydrogen Fluoride (HF) emissions. The emissions of all other regulated air pollutants are below major source thresholds.

Plant-wide Potential Emissions

Pollutant	Potential Emissions	
	(lb/hr)	(ton/yr)
PM	481.44	2108.70
NO _x	13.47	59.00
CO	64.91	284.32
VOC	8.34	36.53
HF	8.66	37.94

Bin Vent Filters (BVF-9528, BVF-9530, BVF-9532, BVF-9534, BVF-9536, BVF-9538) are used to control PM emissions from the six storage silos. Baghouses DC-4B and DC-4C control PM from the Fast-Fire Mixer and Press Feeder and Bin Vent Filters (BVF-9554 to BVF-9584) control press hopper particulate emissions. Similarly, baghouse DC-4A controls PM from the Traditional Mixer and Press Feeder. Dusts from these baghouses are recycled through dust recyclers (EP 62 and EP 58) and added to the Fast-Fire and Traditional Mixers, respectively. Hydro-filters WS-11, WS-12, WS-21, WS-22, WS-51, WS-52 control PM emissions from glaze applications on Lines 1, 2, and 5, and Baghouses DC-31, DC-31, DC-41, and DC-42 control PM emissions from glaze applications on Lines 3 and 4. Baghouses DC-74 and DC-75 control the PM emissions from the Spray Dryer and Prill Silo, respectively. PM emissions from the new Bisque Grinding System and Raw Material Ball Mill will be controlled by Baghouse DC-90.

PM Calculations

The actual PM emissions from those units that are controlled by dust collectors (baghouses and bin vent filters), for which the airflow and PM outlet concentrations are known, were estimated using the following formula:

$$\text{Controlled PM (lb/hr)} = \text{Outlet Conc. (gr/ft}^3\text{)} \times \text{Air Flow (ft}^3\text{/min)} \times (60 \text{ min/hr}) \div (7000 \text{ gr/lb})$$

The uncontrolled PM emissions (emissions that would be emitted if there were not control equipment) were then determined using the control device's efficiency using the following equation:

$$\text{Uncontrolled PM (lb/hr)} = \text{Controlled PM (lb/hr)} \div (1 - \text{efficiency})$$

The actual PM emissions from controlled units, for which the outlet concentration from the dust collector is not known, were determined using production based emissions factors and maximum material throughput rates. First the uncontrolled emissions were determined using the following equation:

$$\text{Uncontrolled PM (lb/hr)} = \text{Emission factor (lb/ton)} \times \text{Material Throughput (ton/hr)}$$

The controlled emissions were then determined for these units using the following equation:

$$\text{Controlled PM (lb/hr)} = \text{Uncontrolled PM (lb/hr)} \times (1 - \text{efficiency})$$

The actual PM emissions from units that are not controlled were also estimated using production based emission factors and maximum material throughput rates. In these cases, the uncontrolled emissions are equal to the controlled emissions.

The following table identifies the AP-42 emission factors that were used to estimate PM. These factors are taken from the *Fifth Edition, Table 11.7-1, Ceramic Products Manufacturing Section*.

PM Emission Factors

Process Description	AP-42 Factor	Units
Blunger(s)	0.12	lb PM/ton
Spray Booth(s)	0.19	lb PM/ton
Spray Dryer	0.6	lb PM/ton
Kilns	0.67	lb PM/ton
Tile Dryers	7.6	lb PM/mmcft
Dry Glaze Booth	0.55	lb PM/ton

The allowable PM emissions for all sources except the Spray Dryer were calculated using the process weight rate formula as shown:

$$\text{Allowable PM (lb/hr)} = 3.59 \times [\text{Material Throughput Rate (ton/hr)}]^{0.62}$$

The allowable PM emissions for the Spray Dryer were determined based on the NSPS concentration limit of 0.057 g/dscm (0.025 gr/dscf).

According to EPA in the Determination Detail document, control number 0000056, written by R. Douglas Neeley, owners and operators of spray dryers that emit less than 11 tons per year of particulate matter are exempt from all opacity monitoring requirements under 40 CFR 60.734. Florida Tile has previously demonstrated through stack testing that particulate matter emissions from the spray dryer are less than 11 tons per year, so no monitoring is required under 40 CFR 60.734.

NO_x and CO Calculations

Because the Nitrogen Oxide (NO_x) and Carbon Monoxide (CO) emissions are not controlled at any emission units at the plant, the potential emissions for a given unit are equal to the actual emissions at the unit's maximum operating rate. NO_x and CO emissions from the dryers, including the Spray Dryer, were calculated using the AP-42 factors from the *Fifth Edition, Small Combustion Sources, Natural Gas Combustion Section*. NO_x and CO emissions from the kilns were estimated using the AP-42 factors from the *Fifth Edition, Ceramics Manufacturing Section, Table 11.7-1*.

NO_x and CO Emission Factors

Process Description	AP-42 Factor NO _x	Units	AP-42 Factor CO	Units
Dryers	100	lb NO _x /MMcf	84	lb CO/MMcf
Kilns	0.54	lb NO _x /ton	3.33	lb CO/ton

The following formula was used to calculate the dryer emissions:

$$\text{Emissions (lb/hr)} = \text{Gas Firing Rate (mmcf/hr)} \times \text{AP-42 Factor (lb/mmcf)}$$

Kiln emissions were calculated as follows:

$$\text{Emissions (lb/hr)} = \text{Material Throughput (ton/hr)} \times \text{AP-42 factor (lb/ton)}$$

VOC Calculations

The Volatile Organic Compounds (VOC) emissions from the dryers and kilns were estimated like the NO_x and CO calculations above using the AP-42 factors listed below. VOC emissions for the rotary glaze applicators were calculated using a previous method employed in a permit amendment application submitted August 10, 1999 and were found to be insignificant.

VOC Emission Factors

Process Description	AP-42 Factor VOC	Units
Dryers	5.5	lb NO _x /MMcf
Kilns	0.43	lb NO _x /ton

Toxics and Hazardous Air Pollutants (HAPs)

Hydrogen Fluoride (HF) Calculations

Hydrogen fluoride (HF), a hazardous air pollutant (HAP), is emitted by the kilns. Using a method previously described, HF emissions were calculated as 37.94 tons per year, using the AP-42 factor from *Fifth Edition, Table 11.7-1, Ceramic Products Manufacturing Section* of 0.46 lb HF per ton.

Hydrogen Fluoride (HF) Modeling

On August 23, 2000, Florida Tile submitted a hydrogen fluoride (HF) air dispersion modeling analysis as a basis for establishing compliance with Kentucky's ambient air quality standard for HF. The analysis included HF emission rates determined through stack testing of all kilns except Kiln 3, which was not operational at the time. Modeling results confirmed that simultaneous operation of all five kilns would be in compliance with the ambient air quality standards. The modeling predicted a second high 12-hour average of 2.04 µg/m³ versus the air quality standard of 3.68 µg/m³. The analysis predicts a second high 24-hour average concentration of 1.58 µg/m³ versus the air quality standard of 2.68 µg/m³.

Florida Tile has requested an increase in the normal operating temperature and cycle time for Kilns 1, 2 and 5 to accommodate new products and to address quality issues. Conservatively, it was predicted that even if the HF emissions from Kilns 1, 2, and 5 increased from 9.4 to 10.63 pounds per hour, a 13% increase, as a result of the increased temperature and cycle time, the ground-level concentrations of HF would still be well below

the ambient air quality standard. The permit contains monitoring requirements on the kiln temperature and cycle time to ensure continued compliance.

Lead Calculations

Lead, another HAP, is emitted from the dryers and kilns, as well as other production equipment, but was deemed insignificant (less than < 0.001 lb/hr).

Plant-wide Emission Estimates

The actual plant-wide emissions are listed below and assume a 24-hour working day, 7 days a week, and 52 weeks a year operating schedule:

Plant-wide Actual Emissions

Pollutant	Actual Emissions	
	(lb/hr)	(ton/yr)
PM	49.37	156.65
NO _x	13.47	59.00
CO	64.91	156.69
VOC	8.34	36.53
HF	8.66	37.94
ZnO ₂	0.03	0.15

The potential emissions from each of the emission units at the plant are equal to the uncontrolled emissions except for those units that have PM control equipment. In those cases, the allowable PM, determined from the state's process weight rate rule, are the potential PM emissions. The total plant-wide potential emissions are shown below:

Plant-wide Potential Emissions

Pollutant	Potential Emissions	
	(lb/hr)	(ton/yr)
PM	481.44	2108.70
NO _x	13.47	59.00
CO	64.91	284.32
VOC	8.34	36.53
HF	8.66	37.94
ZnO ₂	0.79	3.47

Florida Tile has requested voluntary limits to preclude the applicability of 401 KAR 51:017, Prevention of Significant Deterioration (PSD) of Air Quality. Although the potential to emit PM and CO are above the thresholds for major source status under the PSD program, the actual emissions of these pollutants are well below the 250 ton/yr threshold. The closer the synthetic minor

limit to the threshold, the greater the level of monitoring required to provide a reasonable assurance of compliance with the limit by the source. Florida Tile is requesting 225-ton/yr limits on site-wide CO and PM/PM₁₀ emissions (90% of the threshold) and synthetic minor source status under the PSD program. As a result of the margin provided before the threshold is reached, additional monitoring is not required for purposes of assuring compliance with the synthetic minor limit.

APPLICABLE REGULATIONS:

401 KAR 53:010, *Ambient air quality standards*, applies to emission units that emit hydrogen fluoride (See Section D).

401 KAR 59:010, *New process operations*, applies to emission units constructed on or after July 2, 1975.

40 KAR 61:020, *Existing process operations*, applies to emission units constructed before July 2, 1975.

401 KAR 63:010, *Fugitive emissions*, applies to any apparatus, operation, or road which emits or may emit fugitive emissions.

401 KAR 63:020, *Potentially hazardous matter or toxic substances*, applies to each affected facility which emits or may emit potentially hazardous matter or toxic substances, provided such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division for Air Quality.

40 CFR 60, Subpart UUU, *Standards of Performance for Calciners and Dryers in Mineral Industries*, incorporated by reference at Section 3(1)(rrr) of 401 KAR 60:005, applies to spray dryers constructed or modified on or after April 23, 1986 (See Section B).

40 CFR 63, Subpart KKKKK, *National Emission Standards for Hazardous Air Pollutants for Clay Ceramics Manufacturing*, applies to existing, new, or reconstructed kilns at a clay ceramics manufacturing facility (See Section D).

CREDIBLE EVIDENCE:

This permit contains provisions, which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has not incorporated these provisions in its air quality regulations.